

Claims

1. A process for producing mechanical pulp from vegetative matter, said process comprising using high pressure fluid jets to break apart said vegetative matter into small particles and to further reduce the size of said particles by causing them to pass through one or a series of screens or gratings, each comprising successively smaller openings than those of the previous screen or grating in said series.
2. A process according to claim 2, further comprising the step of preliminary preparation of the vegetative matter prior to breaking apart said vegetative matter.
3. A process according to claim 1 further comprising the steps:
  - a. initial sorting of particles by diameter;
  - b. final sorting and alignment of the particles;
  - c. pressing the sorted and aligned particles into bales; and
  - d. drying the bales.
4. A process according to claim 1, wherein the vegetative matter is agricultural waste.

5. A process according to claim 4, wherein the agricultural waste comprises parts of agricultural plants from the group comprising, but not limited

to:

- a. cotton;
- b. corn;
- c. banana;
- d. sunflower;
- e. watermelon rinds;
- f. wheat; and
- g. other cereal crops or grasses.

6. A process according to claim 2, wherein the preliminary preparation of the vegetative matter includes removing the bark or outer layer/s of the stem.

7. A process according to claim 2, wherein the preliminary preparation of the vegetative matter includes soaking said matter in water.

8. A process according to claim 1, wherein the fluid is water.

9. A process according to claim 8, wherein the pressure of the water is between 200 and 1500 atmospheres.

10. A process according to claim 1, wherein the openings in the screens are essentially square ranging between 1 and 20 mesh.

11. A process according to claim 1, wherein the gratings comprise parallel wires (bars) with a spacing of 1 to 20 bars per inch.

12. A process according to claim 1, wherein the series of screens comprises three screens having essentially square openings of 1 mesh, 5 mesh, and 15 mesh respectively.

13. A process according to claim 3, wherein initial sorting of particles by diameter is accomplished by causing them to pass through a series of screens or gratings, wherein each screen or grating in said series contains successively smaller openings.

14. A process according to claim 3, wherein the final sorting and orientation of the particles are carried out by causing said particles to pass through gratings.

15. A process according to claim 3, wherein the sorted and aligned particles are pressed into bales using a pressure of 20Atm to 400Atm.

16. A process according to claim 15, wherein the bales are air dried at a temperature of 30°C to 70°C.

17. A process according to claim 1, comprising further mechanical and/or chemical and/or biological steps for the delignification of the small particles of vegetative matter.

18. A process according to claim 17, comprising biological delignification of the vegetative matter, accomplished by placing said vegetative matter into a container containing water and an inoculum of lignin degrading microorganisms.

19. A process for the production of cellulose fiber pulp from vegetative matter according to claim 17 comprising additionally some, or all of the following steps:

- a. preliminary preparation of said vegetative matter;
- b. chemical delignification, bleaching, and cleaning;
- c. initial sorting of cellulose fibers by diameter;
- d. final sorting and alignment of fibers;
- e. pressing the sorted and aligned fibers into bales; and
- f. drying the bales.

20. A process according to claim 18, wherein the preliminary preparation of the vegetative matter includes soaking said matter in water containing inoculum.
21. A process according to claim 18, wherein the process of biological delignification takes place in a reaction vessel.
22. A process according to claim 21, wherein the process of biological delignification is aided by heating the contents of the reaction vessel.
23. A process according to claim 22, wherein the heating is from room temperature up to a temperature of 65°C.
24. A process according to claim 21 wherein the process of biological delignification is aided by stirring the contents of the reaction vessel.
25. A process according to claim 24, wherein the stirring is carried out by means of a mechanical stirrer and/or streams of gas or water.
26. A process according to claim 21, wherein the biological delignification is carried out continuously by periodically removing the essentially delignified fibers from the reaction vessel and replacing said removed portion with more vegetative matter, water, and inoculum.

27. A process according to claim 19, wherein stabilized hydrogen peroxide is used for chemical delignification and bleaching.

28. A process according to claim 19, wherein initial sorting of cellulose fibers by diameter is accomplished by causing them to pass through a series of screens or gratings, wherein each screen or grating in said series contains successively smaller openings.

29. A process according to claim 28, wherein the series of screens consists of four screens having essentially square openings of 25 mesh, 50 mesh, 75 mesh, and 100 mesh respectively.

30. A process according to claim 28, wherein the series of gratings consists of four gratings comprising essentially parallel wires (bars) with a spacing of 25 to 100 bars per inch.

31. A process according to claim 19, wherein the final sorting and orientation of the fibers are carried out by causing said fibers to pass through gratings.

32. A process according to claim 31, wherein the spacing between adjacent "bars" of the gratings (i.e. the slit width) is in the range of 20 $\mu\text{M}$  to 300 $\mu\text{M}$ .

33. A process according to claim 19, wherein the sorted and aligned fibers are pressed into bales using a pressure of 20Atm to 400Atm.

34. A process according to claim 19, wherein the bales are air dried at a temperature of 30°C to 70°C.

35. Cellulose pulp produced according to the process of claim 1 or claim 17.

36. A product manufactured from cellulose pulp produced according to the process of claim 1 or claim 17.